Application No.: 10/072,773
Filed: February 8, 2002
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CLAIMS

1. (previously presented) A method for changing local sharpness of a photographic image having a multitude of image elements, comprising:

applying a downsampling process to the photographic image to be sharpened, such that coarse image data resulting therefrom represents a coarse image with less detail than the photographic image to be sharpened, wherein the coarse image includes a multitude of coarse image elements;

recognizing at least one region in the coarse image, each such region containing an image of skin, sky or vegetation, wherein the recognition is based at least on a characteristic color in the respective region;

determining a coarse correction mask, elements of the coarse correction mask describing changes of sharpness or local sharpness to be made to respective corresponding image elements of the coarse image, comprising:

using information related the coarse image, including at least local contrast in the coarse image, to determine at least some of the elements of the coarse correction mask; and

wherein:

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the sharpness of at least some image elements in regions of the coarse image that contain images of skin or sky are to be decreased, according to information related to the respective regions; and

the sharpness of at least some image elements in regions of the coarse image that contain images of vegetation are to be increased, according to information related to the respective regions;

applying the coarse correction mask to the coarse image; and

determining a correction mask, elements of the correction mask describing changes of sharpness or local sharpness to be made to respective corresponding image elements of the photographic image;

wherein determining the correction mask comprises using the corrected coarse correction mask.

2. (canceled)

3. (previously presented) The method of claim 1, wherein using information related the coarse image comprises using information related to at least one of color tone, color saturation and color

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contrast of at least one image element in the vicinity of a target image element to determine an element of the coarse correction mask that corresponds to the target image element.

4-5. (canceled)

6. (previously presented) The method of claim 1, wherein using information related the coarse image comprises using at least one of:

information obtained from an analysis of the coarse image; and

information associated with the photographic image and input into a correction process.

7. (previously presented) The method of claim 1, further comprising:

analyzing the coarse image to determine if the coarse image contains at least one characteristic image region having a multitude of image elements; and

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assigning a nominal image sharpness or a nominal image sharpness range to at least one determined characteristic image region; and

wherein determining the coarse correction mask comprises determining at least some of the elements of the coarse correction mask, such that elements of the coarse correction mask that relate to image elements in the at least one determined characteristic image region cause at least an approximation of the image sharpness to the assigned nominal image sharpness or the assigned nominal image sharpness range.

8. (previously presented) The method of claim 7, further comprising:

determining a degree of association of an image element to a characteristic image region; and wherein

determining the coarse correction mask comprises determining at least some of the elements of the coarse correction mask based on the nominal image sharpness or the nominal image sharpness range and the degree of association of the respective image elements.

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9. (previously presented) The method of claim 6, wherein:

using information related the coarse image comprises using color values and image properties including at least brightness and color tone; and further comprising:

determining image content information, comprising:

associating at least one color value with at least one preselected characteristic color value and

associating a nominal image sharpness or a nominal image sharpness range with at least one preselected characteristic color value; and

wherein:

determining the coarse correction mask comprises determining at least some of the elements of the coarse correction mask based on:

color values of image elements of the coarse image that correspond to the respective elements of the coarse correction mask and the preselected characteristic color values associated with the color values of the respective image elements; and

the nominal image sharpness or the nominal image sharpness range associated with the predetermined characteristic color value associated with the color values of the respective image elements.

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10. (previously presented) The method of claim 6, further comprising:

analyzing the coarse image for a transition between two image regions that each includes a multitude of neighboring image elements, wherein one of the image regions has a different structure than the other image region; and

wherein:

determining the coarse correction mask comprises determining at least some of the elements of the coarse correction mask based on whether or not the respective elements relate to a transition.

11. (previously presented) The method of claim 6, wherein:

using information related the coarse image comprises using data related to the position of artifacts in the coarse image; and

determining the coarse correction mask comprises determining at least some of the elements of the coarse correction mask based on whether or not the respective elements relate to locations in the coarse image where artifacts are present.

12-13. (Canceled)

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14. (previously presented) A device for focussing a photographic image that includes a multitude of image elements, comprising:

a downsampling unit operative to produce a coarse image having less detail than the photographic image;

a recognition unit operative to recognize at least one region of the coarse image, each such region containing an image of skin, sky or vegetation, wherein the recognition is based at least on a characteristic color in the respective region;

a coarse correction mask determining unit operative to determine a coarse correctionmask, wherein:

elements of the coarse correction mask describe changes of sharpness or local sharpness to be made to respective corresponding image elements of the coarse image; and

the elements of the coarse correction mask are determined on the basis of an image property of the coarse image, including at least a local contrast, and additional information relating to the coarse image, such that the sharpness of at least some image elements in regions of the coarse image that contain images of skin or sky are to be decreased, according to information related to the respective regions; and the sharpness of at least some

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image elements in regions of the coarse image that contain images of vegetation are to be increased, according to information related to the respective regions; and

a correction mask determining unit operative to determine a correction mask using the coarse correction mask.

15. (previously presented) An article of manufacture, comprising: a computer readable medium storing computer instructions operable to cause a computer that executes the instructions to perform the method of claim 1.

16. (canceled)

17. (previously presented) The device of claim 14, further comprising an image reproduction device.

18. (previously presented) The device of claim 17, wherein the image reproduction device is selected from the group consisting of a photographic printer, a printer, a photolab, a minilab, a monitor, and a computer with a monitor.

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19-21. (canceled)

22. (previously presented) A method for changing local sharpness of a photographic image having a multitude of image elements, comprising:

applying a downsampling process to the photographic image to be sharpened, such that coarse image data resulting therefrom represents a coarse image with less detail than the photographic image to be sharpened, wherein the coarse image includes a multitude of coarse image elements;

recognizing at least one region in the coarse image, each such region containing an image of skin, sky or vegetation, wherein the recognition is based at least on a characteristic color in the respective region;

determining a coarse correction mask, elements of the coarse correction mask describing changes of sharpness or local sharpness to be made to respective corresponding image elements of the coarse image, comprising:

using information related the coarse image, including at least local contrast in the coarse image, to determine at least some of the elements of the coarse correction mask, wherein

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sharpness of at least some image elements in regions of the coarse image exhibiting a high contrast is decreased; and

wherein:

the sharpness of at least some image elements in regions of the coarse image that contain images of skin or sky are to be decreased, according to information related to the respective regions; and

the sharpness of at least some image elements in regions of the coarse image that contain images of vegetation are to be increased, according to information related to the respective regions;

applying the coarse correction mask to the coarse image; and

determining a correction mask, elements of the correction mask describing changes of sharpness or local sharpness to be made to respective corresponding image elements of the photographic image; wherein determining the correction mask comprises using the corrected coarse correction mask.

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